Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of Petition of WorldCom, Inc. Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia Inc., and for Expedited Arbitration.	)	CC Docket No. 00-218
In the Matter of Petition of Cox Virginia Telecom, Inc. etc.	)	CC Docket No. 00-249
In the Matter of Petition of AT&T Communications of Virginia Inc. etc.	)	CC Docket No. 00-251

REBUTTAL TESTIMONY OF

Francis J. Murphy

On Behalf of

VERIZON VIRGINIA INC.

****PUBLIC VERSION****

August 27, 2001

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I. INTRODUCTION AND PURPOSE OF TESTIMONY (JDPL ISSUES II-1 TO 11-1-C; II-2 TO II-2-C)

Q. Please state your full name, employer and business address.

A. My name is Francis J. Murphy. I am the President of Network Engineering Consultants, Inc. ("NECI"), located at 5 Cabot Place, Suite #3, Stoughton MA, 02072.

Q. Please describe NECI and the work you perform.

A. NECI specializes in the fields of cost model analysis and development, and network engineering, planning and implementation. I specialize in service cost analysis as it relates to the telecommunications industry. Since founding NECI, I have analyzed and evaluated telecommunications costing methodologies and models involved with Unbundled Network Elements ("UNEs"), Universal Service Fund ("USF") support, non-recurring costs, avoided costs, and collocation cost proceedings. I have also authored expert reports and provided expert testimony on engineering and cost analyses of models filed in numerous state and federal dockets. During the past four years, I have analyzed extensively the various versions of the HAI Model, the Benchmark Cost Proxy Model ("BCPM"), the Hybrid Cost Proxy Model ("HCPM"), the Federal Communications Commission's ("Commission") universal service cost proxy model ("Synthesis Model"),[1] as well as the model sponsored by AT&T/WorldCom in this proceeding ("Modified Synthesis Model").

[1] In the Matter of the Federal-State Joint Board on Universal Service, In the Matter of Forward-Looking Cost Mechanism for High Cost Support for Non-Rural LECs, CC Docket Nos. 96-45 and 97-160, *Tenth Report and Order*, FCC 99-304 (rel. Nov. 2 1999) ("Tenth Report and Order"); In the Matter of Federal-

My work with these models has included an evaluation of each model's platform and inputs as they were used in different applications including federal USF, state USF, and state UNE cost studies. The fundamental, but distinct difference in requirements for each of these applications, has provided me with a general understanding of the Commission's Orders and court decisions relating to each model's different requirements.

Q. Please summarize your educational background and employment experience prior to founding NECI.

A. I have worked in the telecommunications industry for more than 30 years. Prior to founding NECI, I worked for Financial Strategies Group on behalf of its client, Pacific Bell, in the California Public Utilities Commission's "OANAD" proceeding relating to Pacific Bell's avoided cost studies. Earlier in my career, I worked in the telecommunications industry at NYNEX for over 25 years. While at NYNEX, I held various positions in the Network Operations, cost analysis, marketing, and access services divisions.

I received a Bachelor of Arts degree in Business Management from Boston College in 1986. I have also attended numerous technical, management and service cost-related courses, including Bellcore (now "Telcordia") sponsored

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State Joint Board on Universal Service, In the Matter of Forward-Looking Mechanism for High Cost Support for Non-Rural LECs, CC Docket Nos. 96-45 and 97-160, *Fifth Report and Order*, FCC 98-279 (rel. Oct. 28, 1998) ("Fifth Report and Order").

service cost development and separations and settlement courses. My complete curriculum vitae is set forth in Attachment 1 to my testimony.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to respond to the pre-filed direct testimony of Mr. Brian Pitkin, Ms. Catherine Pitts, Mr. Joseph Riolo, Mr. Steven Turner, and Mr. Richard Walsh filed on behalf of AT&T Communications of Virginia, Inc. ("AT&T") and WorldCom, Inc. ("WorldCom") (collectively, "AT&T/WorldCom") dated July 31, 2001. I will show why, based on my detailed analysis, the Modified Synthesis Model is not appropriate for calculating Verizon Virginia Inc.'s ("Verizon VA") forward-looking costs of providing UNEs in Virginia. I will also show that the platform and input adjustments made by AT&T/WorldCom to the Synthesis Model are improper, incorrect, and unsupported, thereby further distorting UNE cost relationships and understating UNE cost estimates.

Q. Do other Verizon VA witnesses address on AT&T/WorldCom's cost model and inputs?

A. Yes. Dr. Timothy Tardiff of National Economic Research Associates, Inc. addresses significant economic and modeling flaws identified during his examination of the Modified Synthesis Model. In certain instances my testimony and Dr. Tardiff's testimony discuss similar aspects of the Modified Synthesis Model, with my testimony focusing on the Model's engineering and operational

shortcomings, and Dr. Tardiff's focusing on the Model's failure to adhere to basic economic and modeling principles. In addition, Dr. Howard Shelanski addresses the economic principles for determining the forward-looking costs of providing UNEs, Dr. James Vander Weide addresses the appropriate cost of capital that should be used in a cost study, and Mr. Allen Sovereign addresses the appropriate economic lives and salvage values that should be applied.

Q. Please summarize the main points of your testimony.

A. As explained more fully herein, the Synthesis Model was designed solely to support the federal USF program. It was not designed or approved by the Commission to develop intrastate USF calculations, much less estimate company-specific, forward-looking costs of providing UNEs. Indeed, the Commission noted that, by adopting the Synthesis Model, it was "not attempting to identify any particular company's cost of providing supported services."[2]

In an effort to remedy what they see as the obvious model deficiencies and to substantially reduce cost estimates, AT&T/WorldCom made significant changes to the Commission's cost model platform and input values, thus producing the so-called "Modified Synthesis Model." However, AT&T/WorldCom's changes fail to adhere to widely-accepted engineering practices and deviate significantly from appropriate cost modeling techniques. In

[2] Tenth Report and Order at ¶ 162.

essence, AT&T/WorldCom's attempting to fix the Synthesis Model exacerbated existing model flaws, which result in distorted and understated costs estimates.

Specifically, the Modified Synthesis Model sponsored by AT&T/WorldCom contains numerous and serious platform and input flaws that cause it to severely underestimate Verizon VA's or any other efficient carrier's forward-looking costs. Furthermore, the Synthesis Model and the Modified Synthesis Model incorporate engineering design parameters that do not adhere to widely-accepted industry practices and, as a result, model an unrealistic network that could not support the level of customer demand, the types of services, and service quality standards that Verizon VA or any efficient carrier in the real world must accommodate. Tellingly, most of AT&T/WorldCom's modifications have never been approved or adopted by the Commission or any state public service commission. In fact, the only state public service commission to consider a number of AT&T/WorldCom's modifications rejected them.[3]

Moreover, the Synthesis Model, as well as AT&T/WorldCom's Modified Synthesis Model, cannot be fully evaluated and tested. They rely on an outdated programming language, and combine nationwide and state-specific inputs in a manner that is inconsistent with the Model's algorithms and do not reflect Verizon VA's (or any other real company's) operating realities.

[3] Before the Georgia Public Service Commission, Docket No. 5825-U, Phase II, *Order* (Dec. 19, 2000) ("Georgia Order").

Not surprisingly, as the examples below demonstrate, the Modified Synthesis Model's platform and input flaws, as well as its combination of nationwide and allegedly state-specific inputs, produce unrealistic and significantly understated cost estimates. The following list of these flaws is by no means exhaustive:

- The Modified Synthesis Model ignores industry standard loop planning and sizing guidelines, and thus builds insufficient distribution plant to accommodate demand peaks and fluctuations, customer churn, unoccupied housing units, and maintenance needs. In doing so, the Model produces a network that is unable to meet the service quality standards required by the Virginia State Corporation Commission ("Virginia Commission") and expected by Virginia consumers.

- The Modified Synthesis Model improperly assumes that all high-speed services are provisioned on copper loops, despite the fact that some high-speed services (i.e., DS-3 services) can only be provisioned over coaxial or fiber optic cable. Equally absurd is the Model's failure to provision any of the electronic multiplexing equipment necessary to enable these high-speed services to function.

- The Modified Synthesis Model includes only a small fraction of the Digital Cross Connection System ("DCS") investment required to allow the Synchronous Optical Network ("SONET") ring architecture used in the Model to function. By ignoring over $645 million dollars in DCS investment, the Modified Synthesis Model builds an interoffice network is not able to transport calls.

- The Modified Synthesis Model lacks the ability to include special access circuits in the network. Mr. Pitkin's exaggerated loop demand does not compensate for the Model's lack of sophistication to include these circuits, but rather introduces additional errors into the Model. Because of its inability to include DS-1 and DS-3 circuits, the Modified Synthesis Model fails a number of basic total element long run incremental cost ("TELRIC") costing principles.

- AT&T/WorldCom's reduction of the road factor from 1.0 to 0.9 is inappropriately based on a comparison of the embedded cable sheath miles in ***Kansas***. To claim that this reduced road factor value is Virginia-specific is ridiculous. If AT&T/WorldCom had compared the Verizon VA cable sheath miles in ARMIS with the sheath distance calculated by the Model, it would have found that the Modified Synthesis Model generates

less than 85 percent of the cable sheath miles in Virginia, and thus the road multiplier should have been increased, not decreased.

As a result of these and other errors, the Modified Synthesis Model produces the following absurd results:

- The Model estimates an average drop length of only 24 feet -- 50 percent shorter than the average length estimated by the Synthesis Model, and one-third of the average drop length estimated in a national study.

- The Model builds outside plant to only 5,575 distribution areas, despite the fact that there are actually 11,500 distribution areas in Verizon VA's network.

- The Model's inappropriate treatment of special access services understates the estimated loop costs by an extraordinary 50 percent.

- The switch line growth rate (forecasted demand) reflected by the Model is over 4 times greater than the growth rate realized by Verizon in the year 2000.

- The growth rate of call usage ("DEMs") reflected in the Model is nearly two times greater than the amount experienced by Verizon in the year 2000.

Any cost model of this type used by the Commission to calculate UNE costs should adhere to the appropriate TELRIC cost methodology, account for all UNEs, be free of major platform flaws, and be based on realistic and appropriate engineering standards. As discussed more fully below, the Synthesis Model, with or without AT&T/WorldCom's adjustments, does not meet these requirements; it was not designed, and cannot be modified, to estimate accurately the forward-looking costs of any efficient telecommunications provider operating in the real world. As a result, neither the Synthesis Model nor the Modified Synthesis Model should be used to calculate Verizon VA's forward-looking cost of providing UNEs.

Q. Can the network design employed by the Modified Synthesis Model be used to build a functioning telephone network in Virginia?

A. No. The Modified Synthesis Model platform assumptions and design criteria, as well as the selection of inputs, do not reflect realistic and reasonable considerations or accepted engineering standards. In fact, the only consistency in the Model's input assumptions and design criteria is that they improperly decrease the cost outputs of the Model.

- A functioning network must be able to provide all the high-speed special access services (e.g., DS-1 and DS-3 services) and digital data services (e.g., ISDN integrated services digital network ("ISDN") and digital data service ("DDS") available and demanded today. The network design employed by the Modified Synthesis Model is not able to provision the most basic of these services.

- A functioning network must be able to switch calls between all the central offices and to and from other carriers. The network design employed by the Modified Synthesis Model does not provide the equipment necessary to transport calls between the central offices and to interconnect with other carriers.

- A functioning network must be able to meet existing customer demands for new services and new customer demands for any service offerings in a reasonable time frame. The network design employed by the Modified Synthesis Model does not have sufficient capacity to respond in a reasonable time frame to any growth requirements or new demands.

These are only a few of the reasons the network modeled by the Modified Synthesis Model cannot be used to build a functioning telephone network in Virginia.

Q. What would be the result if a network were built to conform with the design criteria and assumptions in the Modified Synthesis Model?

A. Simply put, it would not work. There would be insufficient cable to reach in-service customer premises and no facilities available to serve new customer premises. Drop wires would typically extend onto customer premises but not for enough to reach the buildings where the customers are located. Customers would experience slow dial tone and frequent delays and busy signals during periods of increased call volumes. The interoffice transport network would not function. In other words, the absence of essential equipment would prevent calls from being transported from one central office to another. Moreover, the Model does not contain sufficient investment in power equipment to operate the switches and circuit equipment. Carrier orders for local or interoffice facilities could not be filled in a timely manner, as new facilities would have to be installed to meet the new demand. New customers moving into empty or new housing units would have to wait months to receive service. Local streets and sidewalks would continually be subjected to construction crews digging up surfaces or installing new cables to reach unoccupied and new housing units. Local ordinances to limit new construction to "out-of sight" underground and buried structure would be violated as substantial amounts of aerial structure were deployed.

II. THE SYNTHESIS MODEL WAS NOT DESIGNED TO ESTIMATE FORWARD-LOOKING UNE COSTS (JDPL ISSUES II-1 TO 11-1-C; II-2 TO II-2-C)

Q. Which versions of the Synthesis Model and Modified Synthesis Model did you analyze for purposes of this testimony?

A. My analysis focused on AT&T/WorldCom's Modified Synthesis Model submitted to the Commission on July 2, 2001. Because the foundation of AT&T/WorldCom's Model was the January 20, 2000 release of the Synthesis Model, I also included this version of the Synthesis Model in my analysis. I obtained the Synthesis Model from the "install.zip" file found on the Commission's Internet site, www.fcc.gov/ccb/apd/hcpm/.

Q. Was the Synthesis Model designed to develop forward-looking UNE costs?

A. No. The Commission specifically stated that its model was designed solely to support the federal USF program and cautioned parties not to make other claims regarding its use in determining state universal service support or forward-looking costs for UNEs.[4]

In the Fifth Report and Order, the Commission explicitly alerted parties to the fact that it had not evaluated the Synthesis Model for any purpose other than

[4] Tenth Report and Order at ¶ 31, fn. 416.

national USF cost calculations.[5] Again, in the Tenth Report and Order, the Commission made it clear that:

> The federal cost model was developed for the purpose of determining federal universal service support, and it may not be appropriate to use nationwide values for other purposes, such as determining prices for unbundled network elements. We caution parties from making any claims in other proceedings based upon the input values we adopt in this Order.[6]

The Commission reiterated this position several months ago when it stated:

> The Commission has never used the USF cost model to determine rates for a particular element, nor was it designed to perform such a task. The model was designed to determine relative cost differences among different states, not actual costs. That is the purpose for which the Commission has used the model in the universal service proceeding. [7]

Contrary to Mr. Pitkin's assertions, the Synthesis Model was not intended, and cannot properly be used for the purposes proposed by AT&T/WorldCom[8] -- it cannot develop reliable UNE cost estimates. AT&T/WorldCom's modifications merely exacerbate the problem, producing cost estimates that are significantly understated and inappropriate for state UNE purposes.

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5 Fifth Report and Order at ¶ 12.

6 Tenth Report and Order at ¶ 32 (emphasis added).

7 In the Matter of Application of Verizon VA New England, Inc., Bell Atlantic Communications, Inc. (d/b/a Verizon VA Long Distance), NYNEX Long Distance (d/b/a Verizon VA Enterprise Solutions) And Verizon VA Global Networks Inc. for Authorization to Provide In-Region, Inter-LATA Services in Massachusetts, CC Docket No. 01-9, *Memorandum Opinion and Order*, FCC 01-130 (rel. April 16, 2001) at ¶ 32 (emphasis added).

8 Before the Federal Communications Commission, CC Docket Nos. 00-218, -249, -251, *Direct Testimony of Brain F. Pitkin* (July 31, 2001) at pgs. 2-3 ("Pitkin Direct Testimony").

Q. Are there other reasons why the Synthesis Model is inappropriate for developing UNE costs?

A. Yes. The Synthesis Model platform and inputs were adopted as an expedient approach to identifying the relative differences among states regarding the costs of providing certain narrowly-defined services supported by the federal USF mechanism.[9] In contrast, the Commission in its local competition orders required carriers to provide UNEs that would support a much broader range of services.[10]

As I will demonstrate, there are a number of USF-specific assumptions and factors that render the Synthesis Model incapable of accurately identifying the cost of providing UNEs in Virginia in accordance with TELRIC standards. First, UNEs, as defined by the Commission, differ from the elements that comprise the core USF services. The unbundling requirements and the definitions of UNEs have evolved over time in orders issued before, as well as after, the Commission's definition of the core services supported by the federal USF mechanism. More importantly, TELRIC standards require that the cost of each UNE reflect: (1) the total quantity of facilities and functions that are directly

[9] 47 C.F.R. § 54.101. Services designated for support include: single party (or functional equivalent), voice grade access (minimum bandwidth 300 to 3,000 Hz) to the public switched network, local usage (undefined amount provided free), dual tone multi-frequency signaling (or equivalent), access to emergency services, operator services, inter-exchange service and directory assistance, and toll limitation for qualifying low-income consumers.

[10] 47 C.F.R. § 51.505(b). "The total element long-run incremental cost of an element is the forward-looking cost over the long run of the total quantity of the facilities and functions that are directly attributable to, or reasonably identifiable as incremental to, such element, calculated taken as a given the incumbent LEC's provision of other elements."

attributable to such element; (2) the most efficient technology currently available; and (3) a reasonable allocation of forward-looking common costs.[11] In addition, the Synthesis Model relies on inappropriate engineering standards and principles, and uses national rather than state or company-specific input values. Put simply, the Synthesis Model's platform and inputs, as well as those of the Modified Synthesis Model, do not meet these TELRIC requirements for UNEs and cannot develop accurate UNE cost estimates.

Q. Did you evaluate the impact of AT&T/WorldCom's input changes on plant investment?

A. I have analyzed AT&T/WorldCom's specific input changes that affect items such as structure sharing and plant mix. Although seemingly innocuous individually, each of the changes substantially reduce plant investment as shown below.

[11] 47 C.F.R. § 51.505.

TABLE 1
Effect of AT&T/WorldCom Input Value Changes[12]

AT&T/WorldCom Input Value Change	Total Plant Investment Reduction
Road Factor Reduction	$107.6 million
DLC Cost Reduction	$98.7 million
Structure Sharing Adjustment	$293.4 million
Plant Mix Adjustment	$364.9 million

As I will describe later, AT&T/WorldCom's changes also affect plant investment in other ways, such as a 50 percent reduction in the drop length, even though there is no specific drop length input to the Modified Synthesis Model. Costs are also affected by the Modified Synthesis Model's failure to properly engineer interoffice facilities ("IOF"). For example, SONET investment is understated by up to $784 million.

Moreover, the Modified Synthesis Model cannot be corrected by restoring the input values to their default levels. The Synthesis Model and the Modified Synthesis Model proffered by AT&T/WorldCom contain serious methodological problems and are incapable of estimating Verizon VA UNE costs. Dr. Tardiff demonstrates in his rebuttal testimony the dramatic effect that AT&T/WorldCom's input changes have on the Modified Synthesis Model's loop cost estimates.

[12] The values in Table 1 were determined by using the Modified Synthesis Model inputs as proposed by AT&T/WorldCom as the base run. Each of the inputs were then set back to the default value one at a time and the Modified Synthesis Model was run to determine the impact of that single input change. This process was repeated for each value except for Plant Mix, which was the difference between two separate runs of the Model. Because the input values are interrelated, the total effect of each change will differ from the sum of the individual changes. The change in loop costs referred to later in my testimony is also the result of each of these Model runs.

III. THE MODIFIED SYNTHESIS MODEL PLATFORM IS FUNDAMENTALLY FLAWED (JDPL ISSUES II-1 TO 11-1-C; II-2 TO II-2-C)

Q. Is the Modified Synthesis Model susceptible of a complete analysis?

A. No. It is difficult to analyze the assumptions and algorithms underlying the Modified Synthesis Model because the source code for the feeder and distribution modules of the Model is written in Turbo Pascal and compiled in various ".exe" files. Turbo Pascal is no longer commercially available.[13] Therefore, absent an old copy of the software, the source code cannot be changed and recompiled to conduct a complete and meaningful evaluation of the Modified Synthesis Model or a thorough validation of AT&T/WorldCom's coding changes. In essence, AT&T/WorldCom is asking the parties and the Commission to accept that their assertions are correct without testing the validity or accuracy of their source code changes.[14] Dr. Tardiff addresses additional software-related difficulties he encountered in evaluating the Model.

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[13] *See* Borland Software Corporation's web page for Turbo Pascal at http://www.borland.com/pascal.

[14] In recognition of the difficulties associated with reviewing the model, the Commission recently rewrote portions of the Synthesis Model in Delphi, a programming language intended to replace Turbo Pascal. "In an effort to use a computer language that works best for the Commission and all interested parties, this Public Notice seeks comments on advantages of the Delphi version over the Turbo-Pascal version, and recommendations concerning improvements to the Delphi version." Before the Federal Communications Commission, DA 01-1458, *Common Carrier Bureau Seeks Comment on Translation of Cost Model to Delphi Computer Language and Announces Posting of Updated Cost Model* (June 20, 2001).